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Aggressive Human Behaviour Jerk from Geophysical and Solar Variables

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Abstract

Modern neuroscience suggests that all human experiences and behaviours are produced by brain function and this mass of cells is subject to the same physical and chemical phenomena as other systems. Intergroup conflicts involving death, manifested as group homicides or suicides, are frequent phenomena that are usually explained by social political variables. We explored the feasibility of employing the modern data bases containing precise daily geophysical variables to predict numbers of daily conflicts as inferred by the Integrated Conflict Early Warning System of the Global Database of Events, Language and Tone Project. Over an approximately 1.5 year interval when all values were present, multiple regression lag/lead analyses demonstrated a correlation of +0.38 between numbers of daily "fight" behaviour and the third derivative ("jerks") of the earth's rotation, global numbers of earthquakes between magnitude 3 and 4, and ground-based background photon emissions. These analyses demonstrate the concept in principle that easily accessible environmental data could be ancillary tools to anticipate "unexpected" behavior's defined as terrorism. Thorough analyses from this perspective may reveal hidden variables within these data bases with even greater potential to predict.

Keywords: Aggressive human behaviour; Conflict; GDELT project; Earthquake; Solar flux; Length of day; Jerk

Introduction

Aggressive behaviours between groups of people mediated by aggregates or by individual representatives of the group have defined the history of conflict within the Homo sapiens. Aggregate aggressions have often involved groups such as armies with trained directives and a high probability of individual survival. Single aggressions have resulted in the death of the perpetrator in conjunction with larger numbers of the perceived "other" group through progressively sophisticated ordinance. The causal variables for these clusters of homicides and suicides focused upon the "other" group have been traditionally accommodated by the consequences of instinctual or cultural variables, such as enthnocentricism or religious beliefs when one group's immortality is potentially threatened by the unchallenged validity of another group's religious belief. The roles of physical energies and forces upon the probabilities of inter-group conflict have rarely been considered. Here we present correlational evidence that subtle global geophysical variables might be employed to predict aggressive group behaviours in the modern world.

The increased accuracy and precision of measurements in general within the last two decades have clearly changed our capacity to predict human behaviour and environmental changes. That the human brain is the bases to all behaviours, including thoughts and beliefs as well as probabilities of intention and action, has been repeatedly substantiated by modern imaging techniques. The precision and massive data registrations of energetic releases within the environment such as from seismic events, geomagnetic activity, and subtle shifts in terrestrial dynamics that include micro changes in rotational parameters, are now available on open sites. We Vares and Persinger [1] have shown that human conflict as inferred by daily reports of degrees of political violence [2] demonstrate weak to moderate strength correlations with geophysical and solar variations. Although correlations do not imply cause, a reliable correlation might be helpful for altering the confidence of the prediction concerning the occurrence of some measured amount of mortality and morbidity due to "sudden" or unexpected conflict.

The consideration that global environmental factors could affect global human aggression and conflict was a common theme in the tradition of ancient oracles. Tchijevsky [3] was one of the first to show a strong correlation between solar periodicities and the numbers of wars globally. Persinger [4] employing lag/lead multiple regression procedures found moderately strong associations between annual "social expenditures", the metaphor for massive numbers of death due to conflict, and a combination of global seismicity and solar-geomagnetic activity. His model predicted an inflection of change in social organization and associated conflict for the years 2001 and 2012. Increases in global geomagnetic activity were the strongest predictors for human group aggression. Day-to-day changes in global geomagnetic activity were moderately correlated with aggression in groups of rats whose brains had been modified within the limbic regions [5]. Experimental application of patterned magnetic fields by St-Pierre [5] showed that the extremely intense between male aggressions by these rats could be amplified. Within the human brain these areas are associated with meaning, belief, and aggression, particularly coupled to sexuality.

Grigoriyev and Vladimirsky [6] found that the majority of the numbers (n=532) acts displayed by Hamas during 1987-2005 occurred during maximal global geomagnetic activity. These researchers found that behaviours identified as terrorism occurred on days when the solar activity was declining compared to the previous week. However

clustered within this observation was the escalating slope (rate of change) of geomagnetic disturbances on the day prior to or the day of the specific acts. The coupling of the geomagnetic component to solar variables was suggested by the increase in the rate of acts described as terrorism when the interplanetary magnetic field shifted polarity in a specific direction. If the human brain determines all behaviour and this approximately 1.5 kg mass is subject to the same physical and chemical processes as other dynamic processes, then its dynamics and subsequent overt behaviours could be influenced by a myriad of small energetic events from the geophysical environment in which the species is immersed.

Materials and Methods

The global database of events, language, and tone (GDELT) Project website (http://gdeltproject.org) was accessed similar to our previous analysis [7]. The GDELT Project compiles world media news and categorizes hundreds of "events" with the DARPA-funded Integrated Conflict early warning system (ICEWS) project. Events including riots, protests, and diplomatic exchanges have been the subject of comparative study of political violence [8]. With more than a quarter-billion events dating back to 1979, the GDELT database records include details such as physical location and direction of political intention. As confirmed by the database creator Leetaru and Schrodt [2] the data are considered as a global 'signal' providing insights into human behavioral changes. Conflict and mediation event observation (CAMEO) Event Root Codes label events with a key word, (i.e. 'Event Root Code 02'='Appeal) and further definitions are accessible from the GDELT website http://data.gdeltproject.org/documentation/CAMEO.Man ual.1.1b3.pdf.

The GDELT event database was accessed via Google's Big Query Developers Console, which is a cloud-based analytical database service, designed for large datasets. Fast SQL queries against multi-terabyte datasets were accomplished in seconds, and real-time insights about global human society was made accessible. Only one (1) Event Root Codes was extracted (19='Fight') for dates from January 1, 2003 until December 31, 2015 for a total N=4748 days. To normalize and to compensate for the exponential increase in the availability of global news material over time, the percentage the CAMEO event root code was calculated from the total number of events reported in the GDELT Event Database, across all event types, and broken down by day.

Geophysical variables were retrieved within similar time span. 3 hour AA indices (nanotesla) were retrieved from the international service of geomagnetic indices (ISGI) (http://isgi.unistra.fr), and average daily measures were computed. Earthquake data were retrieved from the northern california earthquake data center`s advance national seismic system (ANSS) which is a composite catalogue of world-wide earthquake data (http://quake.geo.berkeley.edu/cnss/). The earthquake data were entered into Matlab software programming for computation of daily total number of earthquakes within each order of earthquake magnitude (e.g. 0.01M -1.00M, 1.01M -2.00M, etc.) Length of day variations (milliseconds) was retrieved from the California Institute of Technology's Jet Propulsion Laboratory via the National Aeronautics and Space Administration (NASA) (http://euler.jpl.nasa.gov/keof). The combined values of polar motion including optical astrometric measurements were selected (COMB) for noon UTC.

Solar measurements were also retrieved within similar time span. Daily solar flux units (SFU) measures (10^{-22} W•m^{-2} Hz^{-1}) were queried from the national oceanic and atmospheric administration (NOAA) Penticton F10.7 cm index as measured at local noon (2000 UTC). The peak measurement was 2.8 GHz with a 100 MHz band width (https://www.ngdc.noaa.gov/stp/stp.html). Daily total solar irradiance (TSI) measured (W/m^2) for the Earth's orbital distance from the Sun were retrieved from the University of Colorado Boulder laboratory for atmospheric and space physics, solar radiation and climate experiment (SORCE) (http://lasp.colorado.edu/home/sorce/). Sunspot numbers were retrieved from the Royal Observatory of Belgium's solar influences data analysis center (SIDC) through the world data center sunspot index and long-term solar observations (WDC-SILSO) (http://sidc.oma.be/silso/home).

To complement the variable dataset, local photomultiplier tube (PMT) measurements were included. The sensor of the PMT is contained within a thick wooden black box covered with several layers of high thread count black terry cloth. The varying PMT voltages were recorded by an IBM laptop computer once per minute, 24 hr per day since December 1, 2010. The calibrated range from "background" variations over several days where 1 unit change is equivalent to approximately 5×10^{-11} W/m^2, and assuming there are no very intense imminent large (Magnitude >8.0) global earthquakes is within 45 and 55 units. The room in which the PMT was maintained was also sealed from encroaching light.

We have previously demonstrated that solar power (SFU) were positively correlated (parametric and non-parametric) with aggressive behaviour while low magnitude earthquake daily energies were negatively related, each within the same day of the recorded aggressive behaviour [7]. Because the Earth is an open system and is influenced by temporal processes of solar interactions, the geophysical and solar variables were lagged and lead by ± 30 days. Stepwise multiple regression analysis was conducted on the lagged and lead geophysical and solar variables with the event root code 19 ('fight') maintained as the dependent variable. To identify the strength of association, a maximum number of steps was set at four (4) for the regression analysis.

Results and Discussion

The average incidence of the event code 'Fight' per day was 6.966 with a standard deviation of 1.038.0 The results of the stepwise multiple regression, with the reported human behaviour `Fight' as the dependent variable, showed four variables entered into the significant equation [r^2 = 0.147, F(4,577) = 24.670, p < 0.001, R = 0.383, SEE = 0.962].

The equation was:

'Fight' = -0.525(LOD-lag24) + 0.029(PMT-lead11) + 0.032(EQ3-4-lead20) - 0.028(EQ3-4-lead4) + 5.99

It is the combination of a decrease in the length of day (LOD) variations twenty four (24) days prior, an increase of local PMT measurements eleven (11) days after, an increase of total number of earthquakes between magnitude 3.01M–4.00M twenty (20) days after, and a decrease of total number of earthquakes between magnitude 3.01M–4.00M four (4) days after that predict the likelihood of a 'Fight' event during the current day. The prediction equation and the dependant variable were partially correlated by controlling for time (increasing sequence), and the coefficient remained within the same magnitude (0.416-0.406), indicating that time was not a common source of variance.

The excess length-of-day (LOD) variations (milliseconds) are estimates from the Earth orientation. The rapid and sporadic changes in Earth`s orientation are a major source of variance. Gross [9] found these length of day changes gradual over the course of a year. They also show longer patterns of change that can be decades or centuries in duration. These temporal changes have been attributed to the Sun and seasonal heating effects of the Earth's atmosphere and jet stream.

The time variations have also been attributed to geomagnetic 'jerks' and changes in core angular momentum [10]. The 'jerk' is the rate of change of acceleration, or the third derivative of physical position orientation with respect to time and has the unit m/s^3. The entry of the magnitude of the jerk into the prediction may be relevant for several reasons.

First, a significant component of the variance is associated with changes in the solar-geomagnetic field as the solar system moves through space around the galaxy [1].

Second the magnitude of the jerk in terms of changes in angular momentum and hence force applied across the earth's surface for a very brief (msec) duration would approach the range of energies (about 10 Joules per second) associated with cerebral metabolism and certainly would be within the range of energies (10^{-9} J per s) associated with activity of neurons within the cerebral volume. Their pattern of activity is strongly correlated with cognition and decision [11,12]. Although the magnitudes of the jerk-related energies within the brain and the activity associated with cognition could be comparable, this does not prove the energies would be sufficient to produce the specific acts of behaviors described as terrorism.

The entry of the specific magnitude of earthquakes within the 3 to 4 M range over the earth per day may not be spurious. Vares and Persinger [11] observed the conspicuous paucity of 3.6-3.7 M quakes within the cumulative global distribution curves. This energy was considered to be a specific coupling to the zero-point fluctuation force and quantum energies that might be relevant to human activity. The changes in background photon flux density, as a potential predictor, are equivalent to about 10^{-11} to 10^{-10} Watts per meter squared. In comparison the photon flux density associated with human cognition is within the range of 10^{-12} to 10^{-11} Watts per meter squared specifically from the right hemisphere [13]. Stimulation of the right hemisphere by weak, physiologically-patterned magnetic fields (very similar to the ones shown by St-Pierre et al, 1998, to produce enhanced aggression in male rodents) has been associated with increased reports of very meaningful sensed presences by normal volunteers. The experiences are often attributed to deities [14]. If these experiences were considered personal validation of beliefs to cause harm to those originating from other groups, then the probability of extended overt expressions might increase.

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